What is claimed is:

1. A thin film perpendicular magnetic recording head comprising a main pole, a return path for supplying a magnetic flux to said main pole, and a conductive coil for excitation of said main pole and said return path, wherein

said main pole has a magnetic pole width of 200 nanometers or less, and

said main pole possesses a magnetic multilayer made up of a high saturation flux density layer and a low saturation flux density layer,

said high saturation flux density layer contains an Fe-Co alloy, and

the direction of magnetism of a pair of said high saturation flux density layers facing each other by way of said low saturation flux density layer is an antiparallel arrangement in said magnetic multilayer.

2. A thin film perpendicular magnetic recording head comprising a main pole, a return path for supplying a magnetic flux to said main pole, and a conductive coil for excitation of said main pole and said return path, wherein

said main pole has a magnetic pole width of 200 nanometers or less, and

said main pole possesses a magnetic multilayer made up of a high saturation flux density layer and a low saturation flux density layer, and

the thickness of said low saturation flux density layer is within a range of 0.5 nanometers or more to 5 nanometers or less, and said high saturation flux density layer has a thickness from 10 nanometers or more to 50 nanometers or less.

3. A thin film perpendicular magnetic recording head according to claim 2, wherein the thickness of said high saturation flux density layer is 10 nanometers or more to 20 nanometers or less.

4. A thin film perpendicular magnetic recording head according to claim 2, wherein said high saturation flux density layer contains an Fe-Co alloy.

5. A thin film perpendicular magnetic recording head according to claim 2, wherein said high saturation flux density layer is ferromagnetic material, and said low saturation flux density layer is non-magnetic layer.

6. A thin film perpendicular magnetic recording head according to claim 2, wherein the number said high saturated flux density layers contained in said magnetic multilayer is four layers or more.

7. A thin film perpendicular magnetic recording head according to claim 2, wherein the number said high saturated flux density layers contained in said magnetic multilayer is ten layers or more.

8. A thin film perpendicular magnetic recording head according to claim 2, wherein said magnetic multilayer is arrayed in parallel in a direction perpendicular to the medium surface facing the main pole.

9. A thin film perpendicular magnetic recording head according to claim 2, wherein said high saturation flux density layer is an alloy expressed in the general formula and comprising; $(Fe_{70-x}\ Co_{30+x})_{100-y}$

M_y (However, $0 \leq x \leq 20$, $0 \leq y \leq 15$, M is Ni, B, Ti, Nb, Al, Al-O, Si, Si-O or is a combination of same.).

10. A thin film perpendicular magnetic recording head according to claim 2, wherein the crystalline structure of said high saturation flux density layer is mainly a body-centered cubic structure.

11. A thin film perpendicular magnetic recording head according to claim 2, wherein the crystalline structure of said low saturation flux density layer is mainly a face-centered cubic structure.

12. A thin film perpendicular magnetic recording head according to claim 2, wherein said low saturation flux density layer is composed of at least one type from among Ni-Cr, Ni-Fe, Ni-Fe-Cr and Ta.

13. A thin film perpendicular magnetic recording head according to claim 2, wherein in said magnetic multilayer, the pair of said high saturation flux density layers facing each other by way of said low saturation flux density layer possess different thickness.

14. A thin film perpendicular magnetic recording head according to claim 2, wherein among said high saturation flux density layers, the thickness of the layer nearest said substrate and the layer farthest from said substrate are thinner than all other said high saturation flux density layers.

15. A thin film perpendicular magnetic recording head according to claim 2, comprising a read head possessing a magnetoresistive

effect sensor for converting the spatial distribution of the stray magnetic field to a change in resistance or a change in voltage.

16. A thin film perpendicular magnetic recording head according to claim 2, wherein said return path is two section, comprised of a yoke section for sending flux directly to said main pole, and an auxiliary poles, and having a surface facing said substrate, and all are made from ferromagnetic material possessing a saturation flux density lower than said high saturation flux density layer.

17. A fabrication process for a thin film perpendicular magnetic recording head comprising a main pole, a return path for supplying a magnetic flux to said main pole, and a conductive coil for excitation of said main pole and said return path, wherein

said fabrication process includes:

a process for depositing a magnetic multilayer comprised of a high saturation flux density layer containing an Fe-Co alloy and a low saturation flux density layer on a substrate; and

an etching process for etching utilizing ion milling.

18. A magnetic disk drive comprising a magnetic recording medium, a thin film perpendicular magnetic recording head, a positioning device for positioning said thin film perpendicular magnetic recording head on said magnetic recording medium, and said magnetic disk drive supplies read and write electrical current to said thin film perpendicular magnetic recording head and also encodes stored data and decodes reproduced data, wherein

said thin film perpendicular magnetic recording head is composed of a main pole, a return path for supplying a magnetic flux to said main pole, and a conductive coil for excitation of said main

pole and said return path, and said main pole has a magnetic pole width of 200 nanometers or less, and said main pole possesses a magnetic multilayer made up of a high saturation flux density layer and a low saturation flux density layer, and the thickness of said low saturation flux density layer is within a range of 0.5 nanometers or more to 5 nanometers or less, and said high saturation flux density layer has a thickness from 10 nanometers or more to 50 nanometers or less; and

said magnetic recording medium is composed of a recording layer made from ferromagnetic material of high coercive magnetic force for holding the written data by uniaxial magnetic anistrophy and, a flux keeper layer of low magnetic coercivity for assisting in generating a magnetic recording field by an interactive effect with said write element.

19. A magnetic disk drive comprising a magnetic recording medium, a thin film perpendicular magnetic recording head, a positioner device for positioning said thin film perpendicular magnetic recording head on said magnetic recording medium, and said magnetic disk drive supplies read and write electrical current to said thin film perpendicular magnetic recording head and also encodes stored data and decodes reproduced data, wherein,

said thin film perpendicular magnetic recording head is composed of a main pole, a return path for supplying a magnetic flux to said main pole, and a conductive coil for excitation of said main pole and said return path, and said main pole has a magnetic pole width of 200 nanometers or less, and said main pole possesses a magnetic multilayer made up of a high saturation flux density layer and a low saturation flux density layer, and said high saturation flux density layer contains an Fe-Co alloy, and the direction of

magnetism of a pair of said high saturation flux density layers facing each other by way of said low saturation flux density layer is an antiparallel arrangement in said magnetic multilayer; and

said magnetic recording medium is composed of a recording layer made from ferromagnetic material of high coercive magnetic force for holding the written data by uniaxial magnetic anistrophy and, a flux keeper layer of low magnetic coercivity for assisting in generating a magnetic recording field by an interactive effect with said write element.

20. A magnetic disk drive according to claim 18, wherein the center distance of said high saturation flux density layers of said thin film magnetic head is as small as twice of the distance between said main pole and said keeper layer surface during read and write operation.

21. A magnetic disk drive according to claim 18, wherein said flux keeper layer of said magnetic record medium is composed of a magnetic multilayer including said high saturation flux density layers and said low saturation flux density layer; or a magnetic multilayer including a ferromagnetic layer and a nonmagnetic layer; or a magnetic multilayer including a ferromagnetic layer and an antiferromagnetic layer.